

The Water Cycle

In this activity, students will build a model to simulate parts of the water cycle. They will be able to recognize and explain the essential elements of the water cycle.

Background

Water, in its different forms, cycles continuously through the lithosphere, hydrosphere, atmosphere, and biosphere. Water evaporates into the atmosphere from the land and the sea. Plants and animals use and reuse water and release water vapor into the air. Once in the air, water vapor circulates and can condense to form clouds and precipitation, which fall back to earth. At one time or another, all of the water molecules on earth have been in an ocean, a river, a plant, an animal, a cloud, a raindrop, a snowflake, or a glacier!

Water is essential for life on earth. It is recycled through the **water** or **hydrologic cycle**, which involves the following processes:

Evaporation, the changing of water from a liquid to a gas

Condensation, the changing of water from a gas to a liquid

Sublimation, the changing of water from a solid to a gas

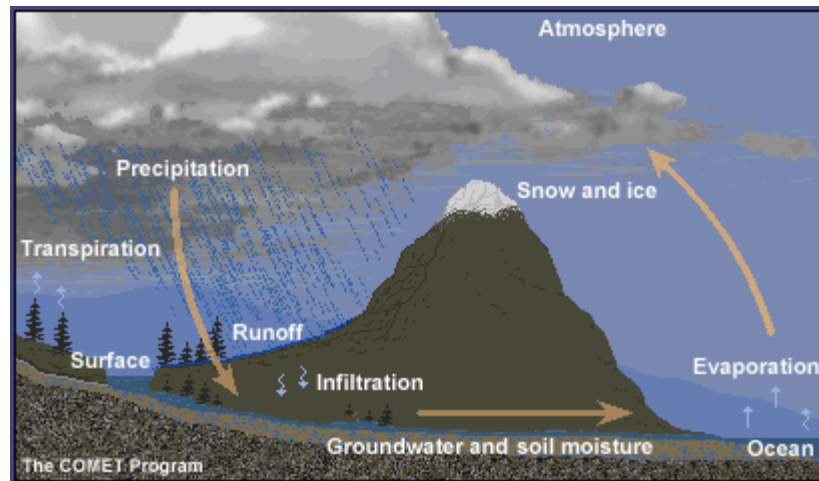
Precipitation, the process by which water molecules condense to form drops heavy enough to fall to the earth's surface

Transpiration, the process by which moisture is carried through plants from roots to leaves, where it changes to vapor and is released to the atmosphere

Surface runoff, the flowing of water over the land from higher to lower ground

Infiltration, the process of water filling the porous spaces of soil

Percolation, groundwater moving in the saturated zone below the earth's surface



Through these processes, the amount of water on earth remains nearly constant and is continually recycled through time. Water molecules may remain in one form for a very long period of time

(for example, water molecules can be locked in Antarctic ice for thousands of years) and in other forms for very short times (for example, water molecules in desert rainstorms spend mere minutes as surface water before evaporating into vapor again).

Learning Goals

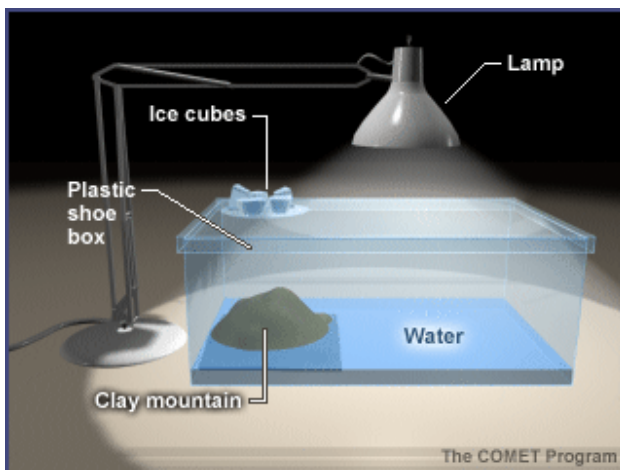
1. Students will appreciate that scale models can be an important tool to use to help understand global processes.
2. Students will be able to recognize and explain the essential elements of the water cycle.

Materials

Rock or anything representing land
Plastic shoe box with cover
Petri dish
Lamp
Water
Crushed ice

Procedure

1. Review the water cycle with students. Show the graphic of the water cycle and explain the various parts.
2. Place the land on one side of the shoe box with the sloped side facing the interior of the box where the "ocean" will be.



3. Pour water into the "ocean" basin till the box has about 1/8 inch.
4. Replace the lid of the shoe box.
5. Place a petri dish on top of the shoe box over the Land (as shown).
6. Place ice into the petri dish.
7. Position the lamp over the ocean. Turn on the lamp. CAUTION: THE LAMP WILL GET HOT. DO NOT TOUCH THE BULB OR SHADE.
8. Have students observe the container carefully and note any changes that they see. It might help to add a little smoke to the aquarium to help them see the circulation. (A few matches lit, then blown out and quickly dropped into the box will work).

Observations and Questions

1. Which part of the activity simulated evaporation?

2. Which part simulated condensation?

3. Which part simulated precipitation?

4. What is the energy source and what does it represent?

5. What elements of the water cycle are not represented?

6. How could we demonstrate transpiration in this activity?

7. Would condensation occur in the box without the ice? Why or why not?

8. After observing this activity, explain why water is considered a renewable resource.

Lab was modified from http://www.ucar.edu/learn/1_1_2_4t.htm